



FOREST PEST CONDITIONS IN CALIFORNIA-1981

**PUBLICATION OF
THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL**

THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL was founded in 1951. Its membership is open to public and private forest managers, foresters, silviculturists, entomologists, pathologists, zoologists, and others interested in the protection of forests from damage caused by weeds, animals, insects, and diseases. Its objective is to establish, maintain, and improve communication among individuals — managers, administrators, and researchers -- who are concerned with these problems. This objective is accomplished by four actions:

1. Coordination of detection reporting and compilation of pest damage information.
2. Evaluation of pest conditions.
3. Pest control recommendations made to forest managing agencies and owners.
4. Review of policy, legal, and research aspects of forest pest control, and submission of recommendations thereon to appropriate authorities.

The State Board of Forestry recognizes the Council as an advisory body in forest pest protection. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

This report, **FOREST PEST CONDITIONS IN CALIFORNIA - 1981**, is compiled for public and private forest land managers to keep them informed of pest conditions on forested land in California, and as an historical record of pest trends and occurrences. The report is based largely on information provided by the Statewide Cooperative Forest Pest Detection Survey; in 1981, 201 reports were received: 55 for insect pests, 90 for diseases, and 56 for animal pests; and from information generated by the Forest Pest Management Staff, Pacific Southwest Region, Forest Service, while making formal detection surveys and biological evaluations.

The report was prepared by the Forest Service in cooperation with other member organizations of the Council. It was duplicated and distributed by the California Department of Forestry.

COVER PHOTO: Black-tailed deer browsing on planted Douglas-fir. Deer damage to conifers in plantations up to ten years of age was the most commonly-reported animal problem in 1981. (Photo courtesy Weyerhaeuser Company.)

HIGHLIGHTS OF PEST CONDITIONS — 1981

STATUS OF INSECTS. Diminished precipitation in 1980-81 increased the stress on California forests and the likelihood of bark beetle outbreaks. Pine engravers, often the harbinger of worsening tree vigor conditions, were active in several areas. The Jeffrey pine beetle continued to kill many trees, particularly in the northern half of Lassen Volcanic National Park and adjacent areas.

The lodgepole needleminer continued to defoliate over 100,000 acres in Yosemite National Park in spite of larval starvation and increasing levels of parasitism. The Jeffrey pine needleminer caused visible feeding damage near Big Bear City for the first time since 1978.

Defoliation by the fruittree leafroller decreased significantly in 1981, and a high incidence of nuclear polyhedrosis virus may foretell a significant reduction of damage from the pandora moth on the Inyo National Forest in 1982-1983. On the other hand, recent trapping reports indicate an increase in numbers of the Douglas-fir tussock moth in the central Sierra Nevada.

Grasshoppers and the Douglas-fir twig weevil were the most important reproduction insects. Cone and seed insects caused serious damage to a generally poor cone crop.

STATUS OF DISEASES. Annosus root disease and dwarf mistletoes continue to be the major disease problems in California forests and recreation areas. Reports of black stain root disease in Calaveras, Glenn, Mariposa, and Santa Cruz Counties increased the known range of the disease on Douglas-fir in the State. Black stain of singleleaf pinyon pine was reported for the first time in Tulare County.

Reports of needle and foliage diseases decreased compared to 1980, while white pine blister rust continued to spread and intensify on sugar pine in the southern Sierra Nevada.

Ambient ozone levels in the southern Sierra exceeded State and Federal Standards on numerous occasions; injury symptoms on pines attributed to ozone increased in 1981 compared to the same trees evaluated in 1977.

Fusarium root rot remained the major problem confronting nurseries in the State. Charcoal root disease, Sirococcus tip blight and Phomopsis canker were reported infrequently.

STATUS OF ANIMAL PESTS. Deer damage to conifer plantations was the most commonly reported animal problem. Significant pocket gopher damage occurred in most timber areas. Porcupine damage was common in the northern interior forests and the northern Sierra Nevada. Black bear and wood rat damage continued on the north coast. Rabbit damage increased over past years.

STATUS AND CONTROL OF INSECTS

PINE ENGRAVER BEETLES, *Ips* spp. Serious group killing of young plantation pines was discovered late in 1981 near Charleton-Chilao in Los Angeles County. This followed earlier unreported outbreaks in that vicinity and also north of Glendora. Top killing of larger trees was reported along Highway 88, Amador County; the Georgetown Divide and Stumpy Meadows, El Dorado County; and scattered pockets of mortality occurred in McCloud Flats, Shasta County. Groups of trees also were killed at Bull Meadows in Siskiyou County, and patches of knobcone pine were beginning to die in Taylor Creek, presumably from attack by pine engravers.

JEFFREY PINE BEETLE, *Dendroctonus jeffreyi*. For the third consecutive year, the Jeffrey pine beetle caused tree mortality in the northern half of Lassen Volcanic National Park and adjacent areas of the Lassen National Forest. Some dead timber was salvaged on the National Forest. Considerable tree killing over several hundred acres was also reported near Willow Creek Station southeast of Adin in Lassen County. Tree mortality continued near Eagle Lake, Lassen County, and in Upper Boulder Creek, Plumas County. Jeffrey pine beetles were also active in campgrounds near Huntington Lake, Fresno County, and Lobo-Oso Campground in San Bernardino County.

WESTERN PINE BEETLE, *Dendroctonus brevicomis*. Western pine beetle activity remained low in 1981. Salvage logging to recover the volume in recently-killed ponderosa pine and thinning to include the removal of risk trees is proposed for treatment of a small outbreak at Miner Creek in Siskiyou County.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae*. Widely scattered infestations of the mountain pine beetle were reported. Numerous lodgepole pines were killed in campgrounds at Huntington Lake, Fresno County. Attacks increased in overstocked plantations of sapling ponderosa pine in Modoc County. The beetle was associated with pine engravers in the chronic mortality occurring over the last several years in dense stands of ponderosa poles and saplings at Bull Meadows, Siskiyou County.

FIR ENGRAVER, *Scolytus ventralis*. The fir engraver continued to kill white fir on the east side of the Cascade-Sierra crest where long-term fire exclusion allowed fir to replace pine on pine sites. The focus reported this year was Horton Canyon, Plumas County, where the deaths of young white fir sawtimber left significant holes within the stands. Additional mortality, also in Plumas County, was reported at Upper Boulder Creek. In many cases, root diseases were involved in the tree mortality.

Other reports of fir engraver activity were from Highway 88, El Dorado County, the San Bernardino Mountains, San Bernardino County, and Taylor Creek, Siskiyou County.

RED TURPENTINE BEETLE, Dendroctonus valens. No infestations of this beetle were reported in 1981. Although examples of turpentine beetle activity were seen in the field, none were of sufficient magnitude to prompt the filing of a detection report.

FLATHEADED WOOD BORERS, primarily Melanophila californica and M. drummondii. The California flatheaded borer, M. californica, continues to be active in Jeffrey pine in Southern California and was reported from the Laguna Mountains, San Diego County, and from the San Bernardino Mountains in San Bernardino County. The fir flatheaded borer, M. drummondii, belatedly killed many Douglas-firs injured in the 1977 Hog Fire in Siskiyou County.

LODGEPOLE PINE NEEDLEMINER, Coleotechnites milleri. Population density at the end of the 1979-81 generation was lower than the previous generation at 19 of 28 plots in Yosemite National Park. The incidence of parasitism, primarily by Apantele and Copidosoma species, increased 50-400%, the largest increase ever recorded for the chronic Tuolumne infestation area. For the first time since population levels were reported in 1975, starvation apparently contributed to significant numbers of larvae failing to pupate. Heavy defoliation continued in nearly all areas in spite of high larval mortality. Six hundred acres of new defoliation was discovered in Jack Main Canyon near the northern boundary of the Park.

FRUITTREE LEAFROLLER, Archips argyrospilus. The total area of visible defoliation in the San Bernardino County infestation declined from the 1980 high of 25,000 acres to approximately 5,000 acres in 1981. This decline following two years of relatively extensive defoliation is similar to the decline that occurred in 1978. That decline was also preceded by two years of extensive defoliation. Only 700 acres near Lake Gregory suffered severe defoliation. Moderate defoliation occurred around Lake Arrowhead (1,400 acres), Sugar Pine Mountain and Monument Peak (2,400 acres), and Forest Falls (300 acres). Defoliation of California black oak was also reported over about 2,000 acres near Dead Mule Saddle, Sequoia National Forest, Hot Springs Ranger District, Tulare County.

JEFFREY PINE NEEDLEMINER, Coleotechnites sp. Approximately 3,000 acres of Jeffrey pine needleminer damage was reported in San Bernardino County near Big Bear City, Sugarloaf, and Erwin Lake along Highway 38. This is the first report of visible feeding injury since 1978.

GYPSY MOTH, Porthetria dispar. Fifty-eight gypsy moths were trapped during the 1981 trapping season. Forty-one were trapped in Santa Barbara (Santa Barbara County), 7 in Marin County, 3 each in Los Angeles and San Diego Counties, and 2 each in Santa Cruz and Ventura Counties. No adult moths were found in San Juan Capistrano, Orange County, which was treated twice in April and May with Sevin 80-S after egg masses were found on seven properties. An intensive egg mass survey of the Santa Barbara area began in September.

PANDORA MOTH, Coloradia pandora. Population monitoring in the 16,000 acre infestation on the Inyo National Forest near Mammoth Lakes showed an increasing incidence of nuclear polyhedrosis virus and an apparent decline in population levels in many areas. In general, virus levels were highest where defoliation was heaviest. No new areas of defoliation were detected in 1981. August pupal collections from six representative areas with primarily light to moderate defoliation indicated an overwintering population of about 0.6 to 3.3 pupae per square foot of forest floor. In addition, a few adults were observed depositing eggs in July, 1981, the "off" year. Collections of these eggs showed high levels of parasitism. Parasitoids reared from the eggs tentatively included Anastatus furnissi (Eupelmidae), two genera of Eulophidae, and an Encyrtidae, genus somewhere near Coccophagus.

DOUGLAS-FIR TUSSOCK MOTH, Orgyia pseudotsugata. No reports of defoliation were received, but results from pheromone traps indicated potentially increasing numbers on the Mi-Wok Ranger District, Stanislaus National Forest, Tuolumne County.

ELM LEAF BEETLE, Pyrrhalta luteola. There were no reports of significant elm leaf beetle activity from the Angeles National Forest in 1981. The beetle had caused problems in a chaparral area in 1979 and 1980.

REPRODUCTION INSECTS. Douglas-fir seedling mortality and twig damage caused by the Douglas-fir twig weevil, Cylindrocopturus furnissi, was common in the north coast Counties. Douglas-fir Christmas trees growing with heavy grass competition were damaged in Sonoma County. Twig killing in natural saplings up to 20 feet tall was abundant on some industrial forest land in Mendocino County.

Grasshoppers defoliated a 10-acre California Forest Improvement Program ponderosa pine plantation near Fairplay in El Dorado County. The Animal and Plant Health Inspection Service (APHIS) conducted an aerial treatment during June to suppress grasshoppers, primarily Melanoplus devastator, within the Granite Burn on the Stanislaus National Forest, Tuolumne County. Twenty to thirty acres of ponderosa pine seedlings were defoliated in the same area in 1980, and monitoring indicated that defoliation could be expected on up to 1,500 acres in 1981. Treatment of the 1,500 acres with 8 ounces of malathion per acre, and of a streamside zone with carbaryl-treated bran bait, substantially reduced the grasshopper populations.

The ponderosa pine tip moth, Rhyacionia zozana, caused scattered damage in about 100 acres of ponderosa pine seedlings in several plantations near Jawbone Lava Flat on the Stanislaus National Forest, Tuolumne County.

The pine needle sheathminer, Zellaria haimbachi, defoliated the current year foliage on about 110 acres of ponderosa pine in the Big and Little Humbug plantations on the Klamath National Forest, Siskiyou County. The level of defoliation was not thought to be serious, but the area was to be monitored for additional damage in 1982.

CONE AND SEED INSECTS. Cone crops generally were poor for all tree species throughout California. Where cones were sufficiently abundant, damage from insects frequently was moderate to heavy and often sufficiently severe to preclude collection. In particular, red fir cone crops in the southern Sierra Nevada were severely damaged. The breeding program at Badger Hill was hindered by heavy cone and seed losses in both Douglas-fir and ponderosa pine.



PANDORA MOTH. Dying pandora moth caterpillar with cocoons of emerged internal parasites (Inyo National Forest, Mono County).

TABLE I. INSECTS OF LIMITED IMPORTANCE IN CALIFORNIA FORESTS - 1981

Scientific Name	PESTS Common Name	HOSTS Names	WHERE EXAMINED OR REPORTED	
			County	Remarks
<u>Acantholida</u> sp.	Webspinning sawfly	JP	Plumas	Scattered, very minor
<u>Anacamptodes</u> <u>clivinaria</u> <u>profanata</u>	Mountain mahogany looper	MM	Mono	
<u>Adelges</u> <u>cooleyi</u>	Cooley spruce gall aphid	DF	Humboldt	Nursery
<u>Cecidomyia</u> <u>piniinopis</u>	Gouty pitch midge	PP	El Dorado	
<u>Chionaspis</u> <u>pinifoliae</u>	Pine leaf scale	MP	Lake	Urban
<u>Elatobium</u> <u>abietinum</u>	Spruce aphid	SS	Del Norte	4 yr. old infestation in Redwood Nat'l Park
<u>Halisidota</u> <u>argentata</u>	Silverspotted tiger moth	DF, PP, WF, IC	Mendocino, Siskiyou, Tehama, Glenn	
<u>Lepidosaphes</u> <u>ulmi</u>	Oystershell scale	SN	Siskiyou	
<u>Matsucoccus</u> <u>acalyptus</u>	Pinyon needle scale	PN	Ventura	40 ac near dust producing mine
<u>Nomophila</u> <u>nearctica</u>	----	CE	El Dorado	Urban
<u>Platypedia</u> sp.	Cicada	DF	Plumas	Saplings, 50-100 trees/acre
<u>Pulvinaria</u> <u>vitis</u>	Cottony maple scale	PM	Amador	
<u>Pyrrhalta</u> <u>luteola</u>	Elm leaf beetle	EL	Colusa	20 campground trees

PESTS		HOSTS Names	WHERE EXAMINED OR REPORTED	
Scientific Name	Common Name		County	Remarks
<u>Stereomnius</u> sp.	-----	WF	El Dorado	Minor damage
-----	Leaf beetle	RI	Tehama	Heavy defoliation
-----	Scales, aphids	JU	Siskiyou	Urban trees

HOST ABBREVIATIONS

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CE = Cedrus	MP = Monterey pine
DF = Douglas-fir	PM = Pacific Madrone
EL = Elm	PN = Pinyon pine
JU = Juniper	PP = Ponderosa pine
JP = Jeffrey pine	RI = <u>Ribes</u> spp.
IC = Incense-cedar	SN = Snowbrush
MM = Mountain mahogany	SS = Sitka spruce
	WF = White fir

TABLE II. CONTROL ACTIONS RECOMMENDED - 1981

AREA	ACREAGE (Est.)	COUNTY	INSECT	HOST	RECOMMENDED ACTION
NORTHERN CALIFORNIA COMMERCIAL AND RECREATIONAL FORESTS					
Northern California	--	--	Db, Dj, Dp, Dps, Mc, Ips, Md, Sv	CF	Stand Management, Slash Disposal
Statewide	--	--	Gm	QA	Surveillance
Statewide	--	--	Op	WF	Surveillance
Lookout Mtn.	16,000	Mono	Cp	JP	Surveillance, Evaluate
PLANTATIONS AND SEED ORCHARDS					
Seed Orchards	100	Northern California	Da	PP, DF, SP	Surveillance, Treat new grafts with Lindane
Plantations	--	Statewide	Eu, Zh, Cp, Rz	CF	Surveillance, Evaluate
STATE AND NATIONAL PARKS					
State and National Parks	--	--	Dj, Db, Dp	JP, PP, SP, LP	Stand management, Prescribe burn, Borax stump treatment
Yosemite	100,000	Tuolumne	Qm	LP	Surveillance

AREA	ACREAGE (Est.)	COUNTY	INSECT	HOST	RECOMMENDED ACTION
SOUTHERN CALIFORNIA RECREATIONAL FORESTS					
Southern California	--	San Bernardino, Los Angeles, Riverside, Ventura, Santa Barbara	Dp, Eb, Dj, Ips Mc, Dv Sv	PP, CP, JP, SP WF	Stand Management, Borax stump treatment, Slash Disposal
Lake Gregory, Lake Arrowhead	5,000	San Bernardino	Aa	OA	Surveillance, Evaluate

PEST ABBREVIATIONS

Aa = Fruittree leafroller
 Cj = Jeffrey pine needleminer
 Cm = Lodgepole needleminer
 Cp = Pandora moth
 Cpp = Pine resin midge
 Da = Fir coneworm
 Db = Western pine beetle
 Dj = Jeffrey pine beetle
 Dp = Mountain pine beetle
 Dps = Douglas-fir beetle
 Dv = Red turpentine beetle
 Eu = Western pineshoot borer
 Gm = Gypsy moth
 Ips = Pine ips
 Mc = California flatheaded borer
 Md = Flatheaded fir borer
 Op = Douglas-fir tussock moth
 Rz = Ponderosa pine tip moth
 Sv = Fir engraver
 Zh = Pine needle sheathminer

HOST ABBREVIATIONS

CF = Conifers
 CP = Coulter pine
 DF = Douglas-fir
 JP = Jeffrey pine
 LP = Lodgepole pine
 MP = Monterey pine
 OA = Oak
 PP = Ponderosa pine
 SP = Sugar pine
 WF = White fir

STATUS AND CONTROL OF DISEASES

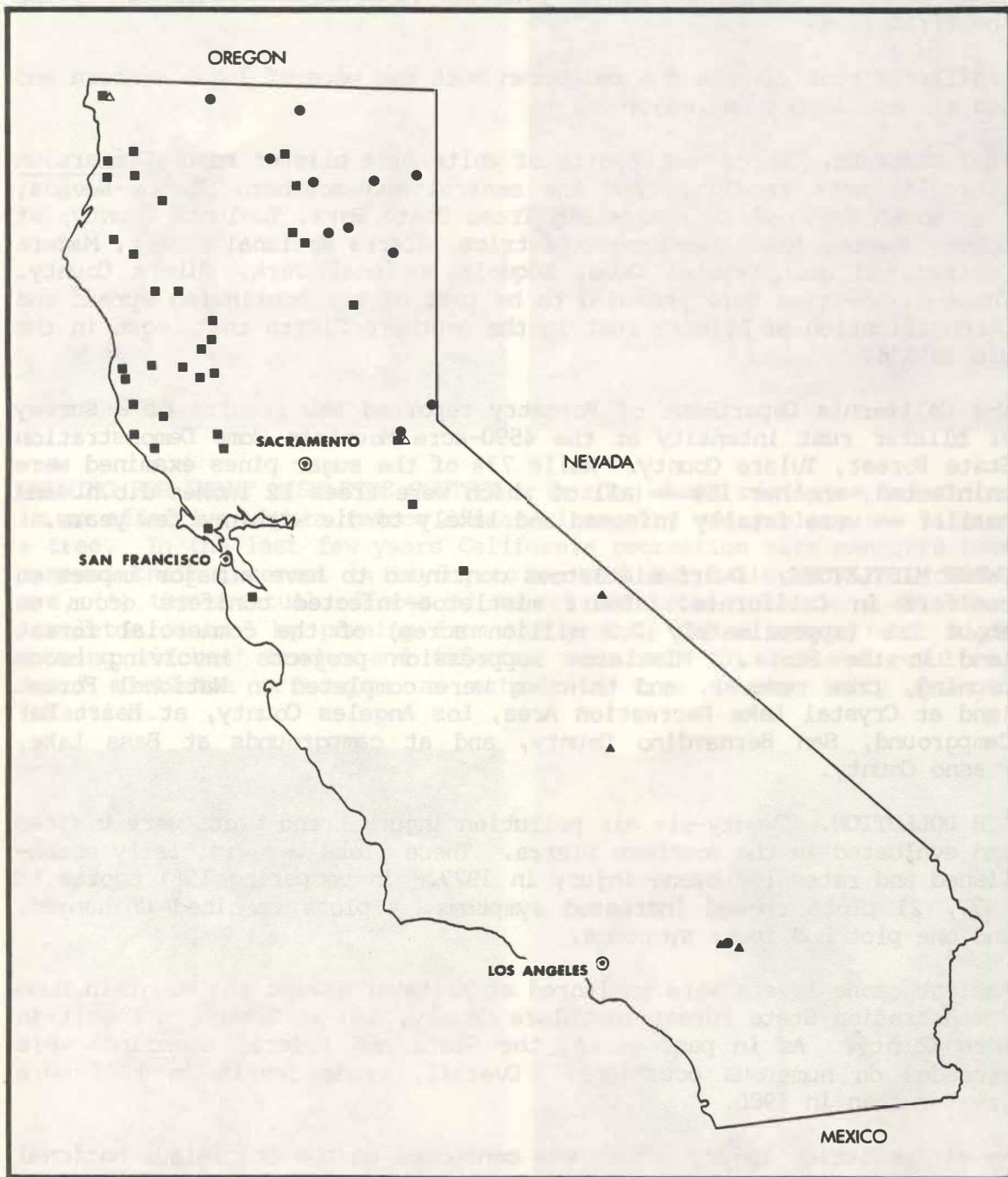
ABIOTIC. Abiotic diseases were reported from widely scattered areas throughout the State, and comprised about 20% of the pest detection reports received in 1981. The most prevalent abiotic diseases were winter damage -- due to either low temperatures or desiccation -- and herbicides. The winter damage reports came from Plumas, Siskiyou, Shasta, and El Dorado Counties. Herbicide damage was reported from San Bernardino, Plumas, and Humboldt Counties. Salt injury was reported on white fir on the Milford Ranger District, Plumas National Forest, Plumas County. Drought was a predisposing factor in some of the insect and disease problems encountered in the late summer and early fall.

FOLIAGE DISEASES. The leaf and needle diseases were relatively uncommon. The rather dry, short spring did not provide the moisture needed for infection by such leaf diseases as the anthracnoses and red band needle blight. The conifer needle casts were found at a low background level. Elytroderma needle disease has, in general, been declining gradually since its last period of high infestation in the early 1970's. However, the San Bernardino National Forest reported a significant increase of Elytroderma deformans on Jeffrey pine, especially in the southeast portion of the Big Bear Ranger District, San Bernardino County.

NURSERY DISEASES. Fusarium root rot, caused by Fusarium oxysporum, remained the major disease problem in California nurseries. The disease was reported on sugar pine at the Humboldt and Ben Lomond Nurseries, on ponderosa and Jeffrey pines at the Placerville Nursery, and on sugar pine, red fir, and white fir at the Magalia Nursery. Fusarium root rot and the charcoal root disease, caused by Macrophomina phaseoli, were associated with the loss of 20% of the 1-0 ponderosa and Jeffrey pines in a nonfumigated block at Placerville. Sirococcus strobilinus was reported on Jeffrey pine and on 2-0 red fir at Humboldt Nursery. The infection on red fir was a new host record. Phomopsis lokoyae on 2-0 Douglas-fir occurred at low levels at the Humboldt Nursery. Rhizoctonia solani was reported on ponderosa and Jeffrey pines at the California Department of Forestry nursery near Magalia.

ROOT DISEASES. Root diseases were of continuing concern to forest resource managers during 1981. Four root diseases were reported in the State: annosus root disease caused by Fomes annosus, Armillaria root disease caused by Armillariella mellea, black stain root disease caused by Ceratocystis wageneri, and red-brown butt rot caused by Phaeolus schweinitzii. Of these four, annosus root disease received the most attention in both pine and true fir stands. Recreation managers throughout the State continued to request assistance in detecting this disease and in developing vegetation management alternatives to reduce its impact.

Black stain root disease of Douglas-fir was identified in several Counties where it had not previously been reported: Calaveras, Glenn, Mariposa, and Santa Cruz. These discoveries extended the range of the



BLACK STAIN ROOT DISEASE. The distribution of black stain, caused by *Ceratocystis wageneri*, on several conifer hosts in California. Each symbol represents one or more infection centers involving a particular host (■ = *Pseudotsuga menziesii*; ● = *Pinus ponderosa* or *P. jeffreyi*; ▲ = *P. monophylla*; △ = *P. lambertiana* or *P. attenuata*).

disease in Douglas-fir southward in both the Coast Range and the Sierra. Black stain of singleleaf pinyon pine was reported in Tulare County for the first time.

Armillaria root disease and red-brown butt rot were of local concern and had minimal impact on resources.

RUST DISEASES. Three new reports of white pine blister rust (*Cronartium ribicola*) were received from the central and southern Sierra Nevada: near South Grove at Calaveras Big Trees State Park, Tuolumne County; at Soquel Meadow, Bass Lake Ranger District, Sierra National Forest, Madera County; and near Crystal Cave, Sequoia National Park, Tulare County. These discoveries were presumed to be part of the continuing spread and intensification of blister rust in the southern Sierra that began in the mid-1960's.

The California Department of Forestry reported the results of a survey of blister rust intensity at the 4590-acre Mountain Home Demonstration State Forest, Tulare County. While 73% of the sugar pines examined were uninfected, another 15% — all of which were trees 12 inches d.b.h. and smaller -- were fatally infected and likely to die within a few years.

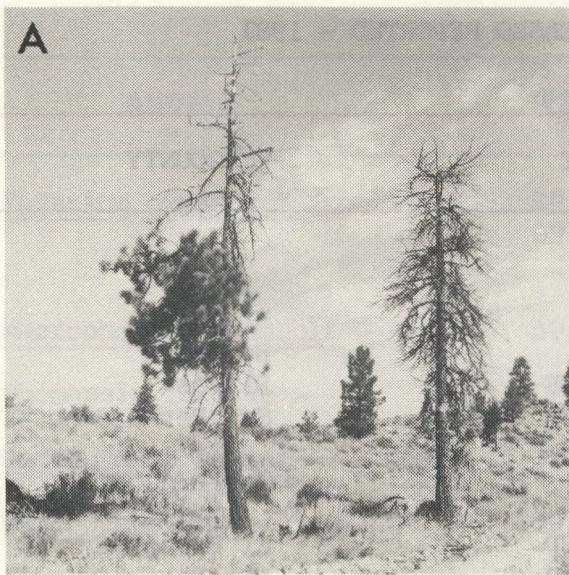
DWARF MISTLETOES. Dwarf mistletoes continued to have a major impact on conifers in California. Dwarf mistletoe-infected conifers occur on about 21% (approximately 2.2 million acres) of the commercial forest land in the State. Mistletoe suppression projects involving broom pruning, tree removal, and thinning were completed on National Forest land at Crystal Lake Recreation Area, Los Angeles County, at Heart Bar Campground, San Bernardino County, and at campgrounds at Bass Lake, Fresno County.

AIR POLLUTION. Twenty-six air pollution injury trend plots were visited and evaluated in the southern Sierra. These plots were initially established and rated for ozone injury in 1977. In comparing 1981 scores to 1977, 21 plots showed increased symptoms, 4 plots remained unchanged, and one plot had fewer symptoms.

Ambient ozone levels were monitored at Whitaker Forest and Mountain Home Demonstration State Forest in Tulare County, and at Greenhorn Summit in Kern County. As in past years, the State and Federal Standards were exceeded on numerous occasions. Overall, ozone levels in 1981 were greater than in 1980.

An air pollution injury survey was conducted on the Stanislaus National Forest in the fall of 1981. Ozone injury to ponderosa and Jeffrey pines was widespread, but generally only slight to moderate in severity.

DUTCH ELM DISEASE. Dutch elm disease (DED) remained confined to eight San Francisco Bay Area Counties. Sixty-five diseased trees were found in 1981, as compared to 244 in 1980. The DED control program was transferred to the California Department of Forestry on November 1, 1981.



PRUNING FOR DWARF MISTLETOE CONTROL. Pruning dwarf mistletoe infections is an effective way to reduce disease intensity and prolong the life of a tree. In the last few years California recreation site managers have renewed their interest in trying to control dwarf mistletoe. Pictured are, (A) the eventual effects of severe mistletoe infection; (B) dwarf mistletoe control by pruning from the ground; (C) a tree climber high-pruning witches' brooms and infected branches; (D) the end result of dwarf mistletoe pruning: an attractive tree substantially free of infection.

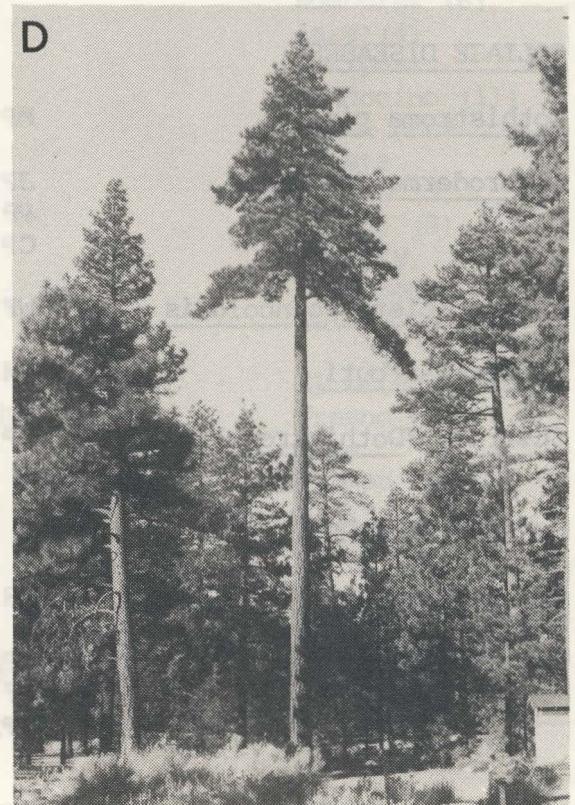


TABLE III. FOREST DISEASES REPORTED - 1981

AGENT	HOST	COUNTY
ABIOTIC DISEASES:		
Chemical	WF DF JP,WF PP,JP	El Dorado Humboldt Plumas San Bernardino
Mechanical	IC	Tuolumne
Weather	PP,SP DF,RF PP PP	El Dorado Plumas Shasta Siskiyou
UNKNOWN DISEASES:		
	DF,PP,SP WF PP,CU,PM SP PP,DF,RF JP	Butte Humboldt Nevada Plumas Siskiyou Ventura
FOLIAGE DISEASES:		
<u>Dothistroma pini</u>	MP	Mendocino
<u>Elytroderma deformans</u>	JP PP CP	San Bernardino Siskiyou Tulare
<u>Lirula abietis-concoloris</u>	WF	Amador
<u>Rhytisma arbuti</u>	PM	Siskiyou
<u>Scirrhia (Dothistroma) pini</u>	MP	Placer
NURSERY DISEASES:		
<u>Botrytis</u> sp.	GS	Butte
<u>Fusarium oxysporum</u>	SP,RF,WF DF JP,PP	Butte Del Norte El Dorado

AGENT	HOST	COUNTY
<u>Fusarium oxysporum</u> (cont.)	SP, RF, DF SP	Humboldt Santa Cruz
<u>Macrophomina phaseoli</u>	JP, PP	El Dorado
<u>Phomopsis lokoyae</u>	DF	Humboldt
<u>Rhizoctonia solani</u>	JP, PP	Butte
<u>Sirococcus strobilinus</u>	JP, RF	Humboldt
<u>ROOT DISEASES:</u>		
<u>Armillariella mellea</u>	PP, SP JP JP PM	El Dorado Lassen Siskiyou Sonoma
<u>Ceratocystis wageneri</u>	DF DF DF DF DF DF DF DF DF DF DF DF DF DF DF KP Pi P	Calaveras El Dorado Glenn Humboldt (6) Lake (4) Mariposa Mendocino (11) Santa Cruz Shasta Sonoma (3) Tehama (8) Trinity El Dorado Tulare
<u>Fomes annosus</u>	IC WF, IC SP WF WF WF	El Dorado Fresno Lake Plumas (2) Siskiyou Tulare
<u>Phaeolus schweinitzii</u>	DF DF DF, SP	Humboldt Mendocino Sonoma

AGENT	HOST	COUNTY
<u>RUST DISEASES:</u>		
<u>Cronartium ribicola</u>	SP SP SP SP	Fresno Madera Tulare Tuolumne
<u>Cronartium stalactiforme</u>	JP	Ventura
<u>Melampsorella caryophyllacearum</u>	WF	Placer
<u>Pucciniastrum sp.</u>	WF	Placer
<u>STEM CANKERS:</u>		
<u>Botryosphaeria ribis</u>	GS	El Dorado
<u>Cytospora abietis</u>	WF WF RF	El Dorado Madera Siskiyou
<u>Dermea pseudotsugae</u>	DF	Siskiyou
<u>PARASITIC SEED PLANTS:</u>		
<u>Arceuthobium spp.</u>	SP, PP RF	El Dorado Siskiyou
<u>Phoradendron spp.</u>	CL MM	Fresno San Bernardino
<u>DECAYS:</u>		
<u>Ganoderma applanatum</u>	EG	San Francisco
<u>Pholiota adiposa</u>	WF	Fresno
<u>Pleurotus ostreatus</u>	PP	Butte

HOST ABBREVIATIONS

CL = California laurel	MM = Mountain mahogany
CP = Coulter pine	MP = Monterey pine
CU = Cypress	PiP = Singleleaf pinyon pine
DF = Douglas-fir	PM = Pacific madrone
EG = <u>Eucalyptus grandis</u>	PP = Ponderosa pine
GS = Giant sequoia	RF = Red fir
IC = Incense-cedar	SP = Sugar pine
JP = Jeffrey pine	WF = White fir
KP = Knobcone pine	

white and brown in the dead wood. Some dead wood may be still sparsely greenish-brown in texture and color. Several species of fungi are known to attack dead wood, especially those which decompose cellulose and lignin. Such fungi, however, do not always kill living trees. Some species of fungi, such as *Phytophthora*, *Pythium*, and *Aspergillus*, are known to cause root rot in living trees. These fungi are often found in association with other organisms, such as nematodes or insects, which may contribute to their pathogenicity.

Root rot is often difficult to diagnose because it has been seen in living trees and may also be confused with other diseases. The presence of water and minerals may be an important factor in determining whether a tree is healthy or not.

TRUE MISTLETOE IN HARDWOODS. True (or leafy) mistletoe (*Phoradendron* sp.) infections in many hardwoods are common sights in much of California. Although these parasites do not drain nutrients from their hosts like the dwarf mistletoes (*Arceuthobium* sp.), they do rob the tree of water and minerals. If the infections are numerous, they may cause enough moisture stress on trees in droughty areas to cause death or significant dieback. The tree shown has almost one-half of its crown occupied by true mistletoe plants, and is considered seriously infected.



KNOW YOUR FOREST DISEASES

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DUTCH ELM DISEASE

Dutch elm disease (DED) is caused by the fungus, Ceratocystis ulmi. Although the disease was introduced into the United States in 1930, it was not found in California until 1975. A control program was immediately established by the California Department of Food and Agriculture (CDFA). Quarantines were enacted to prevent movement of all elm firewood and cuttings, and to prohibit planting of elms where DED was known to exist. The Counties in the control program included Sonoma, Napa, Santa Clara, Solano, San Mateo, Los Angeles, Marin, Contra Costa, and Alameda.

There are over five million elms in California. None of them are native, and most are in urban areas. By learning about the disease cycle and spread, communities can understand the importance of aggressive control programs. DED and the beetle that transmits the disease do not know where city boundaries begin and end. Historically, successful control has relied on the intensive and persistent application of proven procedures. With such programs, annual elm losses can be kept below one percent.

On November 1, 1981, the California Department of Forestry (CDF) took over responsibility for the DED program. The CDF realized the need to stimulate State-wide interest in the biology and detection of this pest. To this end, the CDF is developing the program to be more responsive to local training for early disease recognition.

SYMPTOMS. External symptoms of DED are visible from May through September. If the leaves on an elm droop or wilt, turn yellow or brown, or fall prematurely (see photo on next page), this should be reported immediately to the County Agricultural Commissioner, or to DED project headquarters. In addition to these external symptoms, affected branches often show a brown discoloration of the xylem-phloem tissues as a result of the DED fungus infection, which impairs the movement of water and nutrients through the elm vascular system. Laboratory cultures are necessary to confirm with certainty the presence of the fungus.

*Since 1970, Forest Pest Conditions in California has highlighted a different forest disease each year so that field people can more readily recognize it. Topics have included Fomes annosus root rot, Elytroderma needle disease of pines, phloem necrosis of Douglas-fir, black stain root disease, salt damage to roadside conifers, Cytospora canker of true firs, nursery diseases, F. annosus in red and white fir, mycorrhizae, true mistletoe on white fir, and Phytophthora root rot of Port-Orford-cedar. This year we describe an urban forest pest for the first time.

SPREAD. The DED fungus is spread from tree to tree by bark beetles or by root grafts. In California, the smaller European elm bark beetle (*Scolytus multistriatus*) is the only vector of the fungal spores. This bark beetle is only 1/8 inch long. Among the signs of its presence are pinhead-sized exit holes on the bark surface, while beneath the bark one can see the typical gallery system, with egg galleries parallel to the wood grain and larval tunnels across the grain. The DED fungus may fruit extensively in this gallery system as the brood matures. As the adults chew exit holes, these fungal spores stick to the beetles or are ingested. Infectious adults then fly to healthy elms, where they feed in the crotches of one or two year old twigs. In the process they transmit the fungal spores to the healthy elm, and the destructive cycle begins again. If the fungus becomes systemic, the elm may die within one or two growing seasons. Such an elm then becomes a source of inoculum for the spread of the disease over great distances by bark beetles which may breed in the dead wood. Non-diseased elm wood, in which spore-carrying beetles breed, also contributes to the disease spread. In addition, the fungus may be transmitted by root grafts to healthy trees growing within 40 feet of a diseased tree.

CONTROL. Prevention is the best method for combating DED. It involves five principal steps: 1) detection, 2) tree care, 3) sanitation, 4) root graft prevention, and 5) chemical prevention. These strategies are best implemented as part of a comprehensive urban forestry program.

DUTCH ELM DISEASE. First symptoms of the disease become visible between May and July as elm leaves wilt, turn yellow or brown, and fall prematurely (right). Although caused by a fungus, Dutch elm disease is spread by the smaller European elm bark beetle, which is only 1/8-inch long (below, an adult beetle on a human finger).



Detection of elms with symptoms is the cornerstone of any successful program to control the spread of DED. Since bark beetles fly almost daily from early April to late October, surveying of elms must continue through the entire growing season. This may be complicated by the fact that the foliage on some elms may change color in mid-August due to drought. While under California's eradication program any elm infected with the DED fungus is promptly removed, in other parts of the nation early detection of the DED pathogen may lead to steps to save the tree. In Minnesota and Maine, for example, if the fungus is not systemic or did not enter the tree through root grafts, and the symptoms affect less than 5% of the crown, the fungus may be eradicated by pruning, or by a combination of pruning and fungicide injection.

Tree Care programs aim to improve elm vigor through cultural practices such as pruning, fertilizing, watering, and the prevention of tree damage. This is in contrast to Sanitation, which has as its primary objective the removal of elms with rapidly progressing DED, where no therapy is likely to succeed. The secondary objective of sanitation is the identification and destruction of dead and dying branches, or any other elm material with tightly attached bark, in which bark beetles are likely to breed. While time of season of certain steps is important in tree care programs, sanitation must be implemented throughout the year.

Prevention of root-graft DED transmission can be accomplished mechanically by trenching at least 2 feet deep to sever roots, or by a chemical treatment with Vapam. It is often difficult to prevent this kind of spread, since elms are often located on streets where digging would interfere with pavements and buried utility lines.

Chemical Prevention includes spraying of insecticides, deployment of pheromone baited sticky traps, and fungicide injection. The effectiveness of the insecticides registered by EPA to prevent feeding of S. multistriatus on elm twigs is relatively short-lived. Thus, timing of sprays should be correlated with bark beetle flight. Sticky traps baited with synthetic pheromones have been used by CDFA to monitor both beetle flight activity and the presence of infectious S. multistriatus beetles around DED sites. Injections of the fungicide Arbotect 20-S into elms have been used in preventive trials by the University of California. Using the chemicals currently available for tree injection does not guarantee disease control. These systemic fungicides do not kill the DED fungus but only inhibit the growth or arrest the production of fungal spores in the living tissues. Also, using proper injection techniques is essential to successful prevention; improper methods may do more harm than good. Until an elm, diseased or not, declines to the point where bark beetles will breed in it, it represents no threat of furthering the spread of DED by beetles.

URBAN FORESTRY. The Dutch elm disease problem underscores the need for communities to develop their own urban forest programs. Local programs increase public awareness of tree needs and may thus stimulate action. It is often difficult to estimate the value of trees to a community, and

these values do not impact on the minds of many residents until a tree is lost. Municipal urban forestry programs would help the State DED effort by putting more eyes in the field for early detection of external disease symptoms.

II. FIELD INFORMATION (See instructions on reverse)			
A. COUNTY		B. FOREST (IF ONLY)	
C. LOCATION		D. DISTRICT (IF ONLY)	
E. DATE		F. LAND OWNERSHIP	
G. CAUSE OF DAMAGE		H. SIZE OF TREES DAMAGED	
1. INSECT <input type="checkbox"/> 5. CHEMICAL <input type="checkbox"/>		1. SEEDLING <input type="checkbox"/> 4. SAWTIMBER <input type="checkbox"/>	
2. DISEASE <input type="checkbox"/> 6. MECHANICAL <input type="checkbox"/>		2. SAPLING <input type="checkbox"/> <input type="checkbox"/>	
3. ANIMAL <input type="checkbox"/> 7. OTHER <input type="checkbox"/>		3. POLE <input type="checkbox"/> 5. OVERTUREME <input type="checkbox"/>	
4. WEATHER <input type="checkbox"/> 8. UNKNOWN <input type="checkbox"/>		6. <input type="checkbox"/>	
I. SPECIES DAMAGED		J. NUMBER DAMAGED	
K. DAMAGE DISTRIBUTION		L. STATUS OF DAMAGE	
1. SCATTERED <input type="checkbox"/> 2. GROUPED <input type="checkbox"/>		1. INCREASING <input type="checkbox"/> 2. DECREASING <input type="checkbox"/> 3. STATIC <input type="checkbox"/>	
M. PLANTATION		N. STAND COMPOSITION (SPECIES)	
1. YES <input type="checkbox"/> 2. NO <input type="checkbox"/>		O. STAND AGE AND SIZE CLASS	
P. PEST NAME (IF KNOWN) AND REMARKS (SYMPTOMS AND CONTRIBUTING FACTORS)		Q. STAND DENSITY (STEMS/ACRE)	
R. SAMPLE FORWARDED		S. ACTION REQUESTED	
1. YES <input type="checkbox"/> 2. NO <input type="checkbox"/>		1. YOUR INFORMATION ONLY <input type="checkbox"/> 2. LAB IDENTIFICATION <input type="checkbox"/> 3. FIELD EVALUATION <input type="checkbox"/>	
T. RESPONSE		U. REPORTER'S NAME	
V. REPORT NUMBER		W. SPECIMEN NO.	
X. DATE		Y. SIGNATURE	

STATUS AND CONTROL OF ANIMAL PESTS

DEER. Deer browsing damage to conifer plantations up to ten years of age was the most commonly reported animal problem. Damage occurred on several hundred-thousand acres. The extent of damage was frequently 50 to 100 trees per acre and ranged up to 400 trees per acre. Most of the increase in deer damage — on Douglas-fir, true firs, and pines — occurred in the northern interior forests of Siskiyou, Shasta, and Trinity Counties. Increased injury was also noted in scattered locations in the north coast region, the interior northern coast range, and the Sierra Nevada south to Tuolumne County. There was an increase in the use of seedling protectors and repellents as control measures.

POCKET GOPHER. Significant pocket gopher damage in one- to ten-year-old plantations of pines, true firs, and Douglas-fir continued in all timber areas except the north coast. Many of these infestations were uncontrolled. Oak and incense-cedar were damaged in southern California. Increased damage occurred in Siskiyou and Lake Counties and in scattered locations in the Sierra Nevada. Decreased damage was reported from two sites in Modoc and Trinity Counties. Baiting with strychnine-treated oats and herbicide treatment of vegetation were used for control.

PORCUPINE. Porcupine damage to plantations and natural stands of pines was most common in the interior northern forests, especially in Siskiyou and Modoc Counties, and in the northern Sierra Nevada. Douglas-fir was injured in Humboldt, Trinity, and Mendocino Counties. The overall damage trend was static. Trapping and shooting were employed as control methods. Few strychnine-salt blocks were used.

BLACK BEAR. Black bear damage to second-growth redwood timber continued in Del Norte and Humboldt Counties. In Humboldt County, the damage area was principally in the north, specifically in the Little River drainage east of Trinidad. Damage to Douglas-fir occurred in Siskiyou County. Hunting was used as a control measure.

RABBIT. Rabbits damaged primarily young plantations of Douglas-fir and pines in the north coast and inland northern forests. Less damage occurred in the Sierra Nevada. Fifty percent of the reports of rabbit problems noted an upward damage trend. The use of seedling protectors continued to increase. Some brush windrows were burned to eliminate rabbit habitat.

WOOD RAT. Bark-stripping damage by wood rats continued in the three north coast Counties, but the damage trend was downward. Injury occurred on 10- to 45-year-old Douglas-fir and redwood. Damage to Douglas-fir and ponderosa pine was noted in Lake, Siskiyou, and Shasta Counties. Shooting and nest destruction were used for control on a limited basis.

OTHER ANIMALS. The animals listed below caused damage in the Counties or regions listed. Damage was severe in some areas, but was generally not widespread.

SPECIES	COUNTY OR REGION
Beaver	Humboldt, Trinity, Siskiyou, Shasta, Lassen, Plumas, Butte
Birds	Mendocino (nursery), Siskiyou (grouse)
Elk	Del Norte
Meadow Mouse	Siskiyou, Lassen, Shasta, interior northern coast range
Mountain Beaver	Del Norte, Siskiyou
Small Seed-eating Mammals	Mendocino (nursery), Siskiyou
Tree Squirrels	Humboldt, Mendocino, Lake, Plumas, Butte, San Bernardino
Domestic Stock	All major timber areas
Ground Squirrel	Butte
Antelope	Modoc

BEAR DAMAGE. Basal barking of Douglas-fir by black bear (photo courtesy of Weyerhaeuser Company).



SURVEYS AND EVALUATIONS

DWARF MISTLETOE IN CAMPGROUNDS. The Forest Service completed a long-term biological evaluation that emphasized how dwarf mistletoes can be serious parasites of pines in campgrounds as well as in timber-producing forests. To measure losses from dwarf mistletoe-related mortality of ponderosa and Jeffrey pines, plant pathologists from Forest Pest Management (FPM) and from the Pacific Southwest Forest and Range Experiment Station collected infection intensity and tree vigor data on 3045 pines in five campgrounds in southern and northeastern California and on the Nevada shore of Lake Tahoe. Annual mortality over eight years was compared by mistletoe infection class, radial growth, and age at death.

Overall, 7% (206) of the pines died of natural causes on all five plots. The proportion of trees killed was greater in the more severe infection classes: by the end of the survey, 3% of the uninfected, 4% of the slightly-infected, 7% of the moderately-infected, and 22% of the severely-infected pines had died. Cambium-feeding insects, including western pine beetle, Jeffrey pine beetle, pine engravers, and California flat-headed borer, were involved in the deaths of all but one of the pines. More than 80% of the trees that died were slow-growing and younger than 100 years of age.

BIOLOGICAL EVALUATIONS. The evaluations listed in Table IV were conducted during 1981 by the Forest Service, FPM Staff. These evaluations included brief descriptions of specific pest problems that were important on forest land, and presented current management alternatives, or control options, available to land managers. Copies are available upon request from the Forest Service, FPM, 630 Sansome Street, San Francisco, California 94111.

TABLE IV. BIOLOGICAL EVALUATIONS - 1981

EVALUATION NUMBER	EVALUATION LOCATION	ACRES EVALUATED	HOST SPECIES	PEST OR PESTS INVOLVED
81-a	Timber Sales, Eagle Lake R.D., Lassen N.F.	800	PP,WF	Sv,Ta,Db,Dm
81-b	Mammoth and Mono Lake R.D., Inyo N.F.	16,000	JP	Cp
81-c	Kern Plateau, Cannell Meadow R.D., Sequoia N.F.	4,000	JP	Fa,Ar,Pst
81-1	Charlton-Chilao Recreation Area, Arroyo Seco R.D., Angeles N.F.	800	JP,PP,KP, CP,SP,IC, BDF	Ar,Fa,Am,Oz, Db,Dj
81-2	Crystal Lake Recre- ation Area, Mt. Baldy R.D., Angeles N.F.	500	PP,JP,BDF, IC	Fa,Am
81-3	Colt Timber Sale, Goosenest R.D., Klamath N.F.	250	PP,WF	Am
81-4	Bull Meadow Timber Sale, Goosenest R.D., Klamath N.F.	500	PP	Am,Ca,Ed,Dm, Ips
81-5	Panorama Fire, Arrowhead R.D., San Bernardino N.F.	5	PP,IC,SP, WF,BO,CP	Ips,Dm,Db
81-6	Green Valley Camp- ground, Arrowhead R.D., San Bernardino N.F.	40	JP,WF	Ar,Fa,Am,Phr, Sv,Ta,Dj,Oz, Dm
81-7	Greenleaf Springs Resort, Mono Lake R.D., Inyo N.F.	5	LP	Dm
81-8	Hog Fire, Salmon River R.D., Klamath N.F.	7,000	DF	Md

EVALUATION NUMBER	EVALUATION LOCATION	ACRES EVALUATED	HOST SPECIES	PEST OR PESTS INVOLVED
81-9	Redwood Creek Drainage, Redwood National Park	2,500	DF, MP, AL, SS	Cw, Pha, Aa, Ea, Ac
81-10	Myrtle Creek Progeny Sites, Gasquet R.D., Six Rivers N.F.	20	DF	Cw, Cf
81-11	Cedar Grove Campgrounds, Sequoia and Kings Canyon National Parks	160	PP, JP, SP, WF	Ar
81-12	Equestrian Campground Site, Laguna Mountain, Descanso R.D., Cleveland N.F.	30	JP, CP, BO	Fa, Ar, Mc
81-13	Sunnyside Insect Salvage Timber Sale, Greenville R.D., Plumas N.F.	4,000	JP, PP, WF, DF, IC	Db, Sv, Ta
81-14	Table Mountain Campground, Valleyermo R.D., Angeles N.F.	15	JP, WF, BO	Fa, Ar, Phr, Dj, Ips
81-15	Catahee and Kinnickinnick Campgrounds, Pineridge R.D., Sierra N.F.	5	RF, WF, LP, JP	Ar, Fa, Pha, Dm, Dj, Ips, Ed, Am
81-16	Iowa Sale, Placerville R.D., Eldorado N.F.	2,000	SP, PP, DF, BO	Ar, Db, Dv, Am, Nm
81-17	Mt. Pinos R.D., Los Padres N.F.	800	JP, PiP	Fa, Ar, Ma, Pg, Ra, Sq
81-18	Smog-thinning Plots and Group Campgrounds, San Bernardino N.F.	10	PP, JP, WF, BO	Ed, Fa, Ar, Phr, Dj
81-19	Corning R.D., Mendocino N.F.	1,500	WF, DF, SP	Fa, Cw, Cr

EVALUATION NUMBER	EVALUATION LOCATION	ACRES EVALUATED	HOST SPECIES	PEST OR PESTS INVOLVED
81-20	Sierra and Sequoia National Forests	1.6 MM	PP,JP	Oz
81-21	Horton & Dotta Canyons, Beckworth R.D., Plumas N.F.	200	WF	Fa,Am,Sv,Pspp
81-22	Hat Creek R.D., Lassen N.F.	500,000	JP	Dj
81-23	Upper Boulder Sale, Greenville R.D., Plumas N.F.	7,500	JP,WF,SP, IC,LP	Fa,Ar,Dj,Sv
81-24	Rosebud, Pack-saddle, and Ten Bear Progeny Test Sites, Six Rivers and Klamath N.F.	30	DF	Ac,Su,Ro
81-25	Smith Salvage Sale Scott River R.D., Klamath N.F.	480	PP,BO,WF, DF,SP,IC	Db,Dv,Ar
81-26	Stand 066, Knob Sale, Cannell Meadow R.D., Sequoia N.F.	33	WF,LP,JP	Fa
81-27	Bluff Creek Area, Orleans R.D., Six Rivers N.F.	3	DF,PP,TO, IC	Cw,Ps,Dp
81-28	Bridge and Cave Campgrounds, Hat Creek R.D., and Merrill Campground, Eagle Lake R.D., Lassen N.F.; Nevada Beach Campground, Lake Tahoe Basin Management Unit; Laguna Campground, Descanso R.D., Cleveland N.F.	100	JP,PP	Ar,Db,Dj,Mc, Ips

EVALUATION NUMBER	EVALUATION LOCATION	ACRES EVALUATED	HOST SPECIES	PEST OR PESTS INVOLVED
81-29	Oak Knoll R.D., Klamath N.F.	110	PP	Zh
81-30	Silver Lake, Amador R.D., El Dorado N.F.	300	RF,JP,LP	Fa,Ar,Ca, Sv,Dj,Dm
81-31	Happy Camp R.D., Klamath N.F.	19	DF	De
81-32	Grider Burn Oak Knoll R.D., Klamath N.F.	450	DF,WF,PP, SP,IC	Ar,Md,Db, Dm,Dv
81-33	Klamath N.F.	2	DF	Co,Bc,Ms,Ca
81-34	Goosenest R.D., Klamath N.F.	800	RF,WF	Dr,Pspp
81-35	Goosenest R.D.	2,000	PP	Dr,Pe
81-36	Dinkey Creek Camp-ground, Kings River R.D., Sierra N.F.	80	PP,WF, IC,SP	Fa,Ar,Phr, Db,Dm,Dv,Sv
81-37	Sundown Sale Unit, Illinois Valley R.D., Siskiyou N.F.	13	RF	Ca,Ar
81-38	North Shore Camp-ground, Arrowhead R.D., San Bernardino N.F.	20	BO,CP	Phr,Ar,Db

HOST ABBREVIATIONS

AL = Alder
BDF = Big Cone Douglas-fir
BO = Black oak
CP = Coulter pine
DF = Douglas-fir
IC = Incense-cedar
JP = Jeffrey pine
KP = Knobcone pine
LP = Lodgepole pine
MP = Monterey pine
PiP = Singleleaf pinyon pine
PP = Ponderosa pine
RF = Red fir
SP = Sugar pine
SS = Sitka spruce
TO = Tanoak
WF = White fir

PEST ABBREVIATIONS

Aa = Alder flea beetle
Ac = Cooley spruce gall aphid
Am = Armillaria root disease
Ar = Dwarf mistletoe
Bc = Douglas-fir cone moth
Ca = Cytospora canker
Cf = Douglas-fir twig beetle
Co = Cone gall midge
Cp = Pandora moth
Cr = White pine blister rust
Cw = Black stain root disease

PEST ABBREVIATIONS

Da = Fir coneworm
Db = Western pine beetle
De = Dermea canker
Dj = Jeffrey pine beetle
Dm = Mountain pine beetle
Dp = Douglas-fir beetle
Dr = Drought
Dv = Red turpentine beetle
Ea = Spruce aphid
Ed = Elytroderma disease
Fa = Annosus root disease
Ips = Pine engraver
Ma = Pinyon needle scale
Mc = California flatheaded borer
Md = Flatheaded fir borer
Ms = Douglas-fir seed chalcid
Nm = Pine butterfly
Oz = Ozone damage
Pe = Pesticide
Pg = Pocket gopher
Pha = Western gall rust
Phr = True (leafy) mistletoe
Ps = Velvet top fungus
Pspp = Twig beetles
Pst = Stalactiform rust
Ra = Rabbit
Ro = Rodent
Sq = Squirrel
Su = Engraver beetle
Sv = Fir engraver
Ta = Fir roundheaded borer
Zh = Pine needle sheathminer

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THE COOPERATIVE FOREST PEST DETECTION SURVEY is sponsored by the California Forest Pest Control Action Council. Detection of damage due to insects, diseases, animals, weather, chemicals, air pollution, and weeds should be reported on the Forest Pest Detection Report, form R5-3400-1 (see illustration on page 21), or by card or letter. The Pest Action Council encourages Federal, State, and private land managers and individuals to contribute to the Detection Survey by submitting detection reports and samples in the following manner.

FEDERAL PERSONNEL. Send all detection reports through channels, and mail samples with a copy of the report to:

USDA, FOREST SERVICE, Forest Pest Management
630 Sansome Street, San Francisco, CA 94111.

STATE PERSONNEL. Send all detection reports through channels, and mail samples with a copy of the report to:

CALIFORNIA DEPARTMENT OF FORESTRY
1416-9th Street, Sacramento, CA 94814.

PRIVATE LAND MANAGERS AND INDIVIDUALS. Send all detection reports and samples to:

CALIFORNIA DEPARTMENT OF FORESTRY
1416-9th Street, Sacramento, CA 94814.

Please submit adequate injury samples with each detection report. If possible, send several specimens illustrating the stages of injury and decline. Keep samples cool and ship them immediately after collection. Send them in a screw-top mailing tube or other sturdy container, and enclose a completed copy of the detection report.

All detection reports will be acknowledged and evaluated by specialists concerned with damage cause by forest pests.

Additional copies of the Forest Pest Detection Report form are available from the Forest Service, Forest Pest Management, and the California Department of Forestry.

YOUR COOPERATION WITH THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL IN ASSISTING WITH THE COOPERATIVE FOREST PEST DETECTION SURVEY IS GREATLY NEEDED AND APPRECIATED.